

CLAIMS:

1. A method of applying a film coating to an end of a container stopper, including the steps of:
 - 5 positioning the stopper with the said end adjacent a web of film;
cutting from the web a portion of film sized to suit said end of the stopper; and
bonding the film portion to the end of the stopper.
- 10 2. A method according to claim 1, wherein the step of positioning the stopper with the said end adjacent the web of film includes transporting or conveying the stopper to such a position.
- 15 3. A method according to claim 1 or claim 2, wherein the step of positioning the stopper with the said end adjacent the web of film includes orienting the stopper such that the end is adjacent the film web.
- 20 4. A method according to any one of claims 1 to 3, wherein the step of cutting the film portion from the web includes the step of fixing the film portion relative to the end of the stopper.
- 25 5. A method according to claim 4, wherein the step of fixing the film portion relative to the end of the stopper comprises adhesively tacking the cut portion of the film to the end of the stopper over at least part of the area of the film portion.
- 30 6. A method according to claim 5, wherein the step of adhesively tacking the film portion to the end of the stopper includes applying heat to and pressing said part of the film portion into contact with the end of the stopper, said application of heat activating adhesive properties of the film portion.
7. A method according to claim 5, wherein the step of adhesively tacking the film portion to the end of the stopper includes applying an adhesive

substance to the end of the stopper and pressing the at least part of the film portion into contact therewith.

5 8. A method of applying a film coating to an end of a container stopper, including the steps of:

providing a stopper having at least one end to be coated;

cutting from a web of film a portion of film sized to suit said end of the stopper;

10 applying the cut film portion to the end of the stopper; and
bonding the film portion to the end of the stopper.

15 9. A method according to claim 8, wherein the film portion is pre-cut from the film web to be applied to the end of the stopper as a label-like element prior to the bonding step.

20 10. A method according to any one of claims 1 to 9, wherein the step of bonding the film portion to the end of the stopper includes the step of applying heat over substantially the entire area of the film portion to activate adhesive properties of the film and pressing the heated film portion and the end of the stopper into contact with one another.

25 11. A method according to claim 10, wherein the adhesive is a hot-melt adhesive applied to the film by spraying or extrusion coating.

30 12. A method according to any one of claims 1 to 9, wherein the step of bonding the film portion to the end of the stopper includes the step of applying adhesive to the end of the stopper and subsequently pressing the film portion and the end of the stopper into contact with one another.

35 13. A method according to claim 12, wherein the adhesive is a hot-melt adhesive applied to the end of the stopper prior to the portion of film being cut from the web.

14. A method according to any one of claims 1 to 13, wherein the portion of film cut from the web is sized and shaped to substantially entirely cover the end of the stopper substantially without excess of film.

5 15. A method according to any one of claims 10 to 14, wherein the step of pressing the film portion and the end of the stopper into contact with one another during the film-bonding step involves the use of a press or mandrel shaped to complement the geometry of the end of the stopper.

10 16. A method according to claim 15, including the step of heating the press or mandrel.

15 17. A method according to any one of claims 1 to 16, including the step of curing the bond between film portion and the end of the stopper.

 18. A method according to claim 17, wherein the step of curing the bond involves cooling the film portion and the end of the stopper to set the bond and ensure proper adhesion there-between.

20 19. A method according to claim 17 or claim 18, wherein the step of curing the bond includes pressing the film portion and the end of the stopper into contact with one another.

25 20. A method according to claim 19, wherein the pressing of the film portion and the end of the stopper into contact with one another during the curing step involves the use of a press or mandrel shaped to define the geometry of the end of the stopper.

30 21. A method according to claim 20, wherein the curing press/mandrel is cooled.

 22. A method according to any one of claims 1 to 21, wherein the container stopper has a substantially cylindrical body having two opposite ends,

and the method involves applying a film coating to each of said two ends of the stopper at substantially the same time.

23. A method according to any one of claims 1 to 22, wherein the
5 container stopper has a substantially cylindrical body having two opposite ends, and the method involves applying a film coating to one of said two ends of the stopper, inverting the stopper and then applying a film coating to the other of said two ends of the stopper.

10 24. A method according to claim 23, wherein the step of inverting the container stopper includes returning the stopper to a starting position for the method.

25. A container stopper having a film coating applied to at least one
15 end thereof according to the method of any one of claims 1 to 24.

26. A packaged product comprising a liquid in a container, the container including a container stopper according to claim 25.

20 27. An apparatus for applying a film coating to an end of a container stopper, the apparatus including:

means for positioning the stopper with the said end thereof adjacent a web of film;

25 means for cutting from the web a portion of film that is sized to suit the end of the stopper; and

means for bonding the film portion to the end of the stopper.

28. An apparatus according to claim 27, wherein the positioning
30 means includes conveyor means for transporting the stopper to a position adjacent the web of film.

29. An apparatus according to claim 28, wherein the conveyor means includes a carriage for holding one or more of the stoppers and transporting the stopper(s) therein.

5 30. An apparatus according to claim 29, wherein the conveyor means includes a plurality of carriages, each of which is adapted to hold a group of stoppers.

10 31. An apparatus according to claim 29 or claim 30, wherein each stopper is held in a carriage with the end to be coated facing the film web.

 32. An apparatus according to any one of claims 28 to 31, wherein the conveyor means includes an endless belt or endless chain type conveyor.

15 33. An apparatus according to any one of claims 28 to 31, wherein the conveyor means includes a rotary table or drum.

20 34. An apparatus according to any one of claims 28 to 33, wherein the conveyor means is furthermore adapted to transport the stoppers from the cutting position adjacent the web of film to the bonding means.

25 35. An apparatus according to any one of claims 27 to 34, wherein the apparatus further includes loading means for loading the stoppers into each carriage on the conveyor means.

 36. An apparatus according to claim 35, wherein the loading means includes a bulk container, such as a hopper, adapted to channel or direct stoppers into holding receptacles in each carriage.

30 37. An apparatus according to any one of claims 27 to 36, wherein the cutting means includes a cutting edge that defines the size and shape of the film portion to be cut from the web.

38. An apparatus according to claim 37, wherein the cutting edge is movable relative to the film web, and the cutting means also includes a surface against which the cutting edge bears as the film portion is cut from the web.

5 39. An apparatus according to claim 37 or claim 38, wherein the cutting means includes a recess adapted to receive said end of the stopper for locating the end relative to the cutting edge during cutting of the film.

10 40. An apparatus according to any one of claims 27 to 39, wherein the web of film is provided on a spool, and the spool is adapted to be advanced after each cutting operation to provide a fresh film web for the next cutting operation.

15 41. An apparatus according to any one of claims 27 to 40, wherein the cutting means includes means for fixing the cut film portion relative to the end of the stopper.

20 42. An apparatus according to claim 41, wherein the means for fixing the cut film portion relative to the end of the stopper comprises means for adhesively tacking the film portion to the end of the stopper over at least part of the area of the film portion.

25 43. An apparatus according to claim 42, wherein the tacking means comprises a mechanism adapted to apply an adhesive substance to the end of the stopper and to press at least part of the film portion into contact therewith.

30 44. An apparatus according to claim 42, wherein the tacking means comprises a mechanism adapted to apply heat to part of the film portion to activate adhesive properties of the film and to press the heated film portion into contact with the end of the stopper.

 45. An apparatus according to claim 44, wherein the tacking mechanism includes a heated tacking head, which is movable to contact at

least part of the film and to press that part of the film into contact with the end of the stopper.

5 46. An apparatus according to claim 45, wherein the tacking head is adapted to act substantially simultaneously with the cutting edge.

10 47. An apparatus according to claim 45, wherein the position of the tacking head is adjustable relative to the cutting edge such that it is possible to vary a diameter of the film portion disc cut from the web.

15 48. An apparatus according to any one of claims 27 to 47, wherein the means for bonding the cut film portion to the end of the stopper includes means for applying heat over substantially the entire area of the cut film portion to activate adhesive properties of the film, and means for pressing the heated film portion and the end of the stopper into contact with one another.

20 49. An apparatus according to claim 48, wherein the bonding means includes a heated bonding head in the form of a press or mandrel adapted to apply pressure against the end of the stopper with the film at least partially affixed thereto.

25 50. An apparatus according to claim 49, wherein the bonding head includes a recess adapted to receive the end of the stopper, and the recess is sized and shaped to complement the geometry of the stopper end.

30 51. An apparatus according to claim 49 or claim 50, wherein the bonding head is movable relative to the stoppers sitting in each carriage, or vice versa.

30 52. An apparatus according to any one of claims 27 to 47, wherein the means for bonding the cut film portion to the end of the stopper includes means for applying adhesive to the end of the stopper and subsequently pressing the film portion and the end of the stopper into contact with one another.

53. An apparatus according to any one of claims 27 to 52, wherein the cutting means and the bonding means are combined in a single operating head.

5 54. An apparatus according to claim 53, wherein the cutting edge is provided on a cutting die, and wherein a base of the cutting die is provided with a shaped recess and is adapted to be heated, and to press the cut film portion into bonding contact with the end of the stopper body just as the die cuts the film portion from the web.

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55. An apparatus according to any one of claims 27 to 54, further including means for curing the bond between film portion and the end of the stopper.

15 56. An apparatus according to claim 55, wherein the bond curing means is adapted to cool the film portion and the end of the stopper to set the bond and ensure proper adhesion there-between.

20 57. An apparatus according to claim 56, wherein the curing means includes a curing head in the form of a press or mandrel shaped to define the geometry of the end of the stopper.

25 58. An apparatus according to claim 57, wherein the curing head press/mandrel includes recesses for receiving the ends of the stoppers, with the recesses sized and shaped to define the three-dimensional geometry of the end of the stopper.

30 59. An apparatus according to any one of claims 27 to 58, wherein each container stopper has a substantially cylindrical body having two opposite ends, and wherein the apparatus further includes means for inverting each stopper and then applying a film coating to the other of said two ends of the stopper.

60. An apparatus according to claim 59, wherein the inverting means comprises a mechanism for extracting the container stoppers from their conveyor means carriage and returning the stoppers to a starting position in a different carriage.

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61. An apparatus according to any one of claims 27 to 58, wherein each container stopper has a substantially cylindrical body having two opposite ends, and wherein the apparatus is adapted to apply a film coating to each of the opposite ends of the stopper body substantially simultaneously.

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62. An apparatus according to any one of claims 28 to 58, wherein the conveyor means is adapted to eject the stoppers to a bulk container after the application of the film coating to the end(s) thereof is completed.